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Soil-water and soil physical properties under contour hedgerow systems on sloping oxisols

F. Agus^a, D.K. Cassel^{b,*}, D.P. Garrity^c

^a Center for Soil and Agroclimate Research, Jln. Juanda 98, Bogor 16123, Indonesia

^b Dept. of Soil Science, North Carolina State University, P.O. Box 7619, Raleigh, NC 27695, USA

^c Southeast Asian Regional Research Programme, International Center for Research in Agroforestry, Jln. Gunung Batu No. 5, Bogor, Indonesia

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Abstract

Hedgerows planted along the contour on steep lands in the humid tropics reduce soil erosion and build terraces over time. The objectives of this study in two Hapludoxes in the Philippines were to evaluate changes after 4 years in soil properties and soil water relations on transects perpendicular to the cropped alleys between four grass and tree hedgerow systems and a control. Hedgerow plants included *Gliricidia sepium*, *Paspalum conjugatum*, and *Penisetum purpureum*. Soil properties evaluated as a function of position in the alley (upper, middle, or lower elevation in an alley) included bulk density, mechanical impedance, soil water transmissivity, water retention, soil water pressure, and soil water content. In general, soil properties were not affected by hedgerow system, but were affected by position in the alley. Nearness to the hedgerow, but not hedgerow species, affected soil water distribution ($P = 0.05$). Plant available water at the 10–15 cm depth was $0.16 \text{ m}^3 \text{ m}^{-3}$, $0.13 \text{ m}^3 \text{ m}^{-3}$, and $0.08 \text{ m}^3 \text{ m}^{-3}$ for the lower, middle, and upper alley position, respectively. Water transmissivity decreased from 0.49 mm s^{-1} in the lower alley to 0.12 mm s^{-1} in the upper alley. The lower soil water contents and soil water pressures in and near the hedgerows confirmed competition for water between the hedgerow species and the food crop in the alley, a condition that is expected to suppress food crop production.

Keywords: Alley cropping; Hedgerows; Soil physical properties; Soil water retention; Soil water transmissivity

* Corresponding author.